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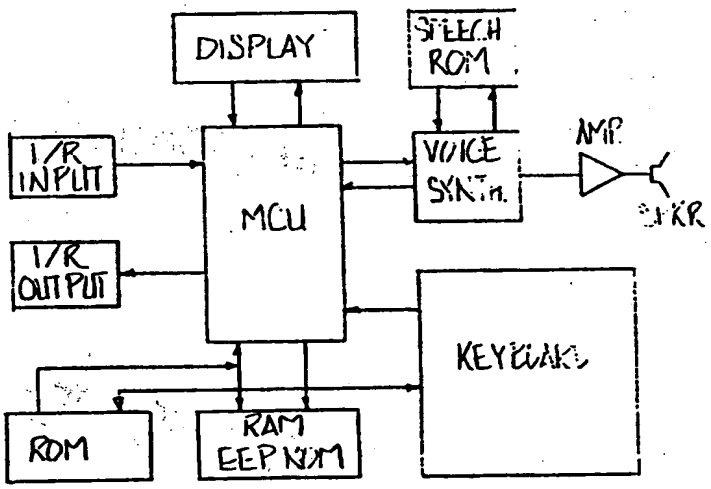
(54) Title: UNIVERSAL REMOTE CONTROLLER WITH SYNTHESIZED VOICE INTERFACE

(57) Abstract

A universal remote controller for actuating and signalling electronic devices may be either a learning type or one with preprogrammed codes particularized for certain electronic devices to be controlled. The controller has an internal voice synthesizer (14) creating a voice prompt to be heard by a person using the controller, an internal clock (10) within the controller and a detection circuit (19) for registering user inputs made in response by a person hearing the voice prompt. From the detection circuit, the clock is set based upon signals received at the detector. The clock and transmitter (23) provide a code setting for programming a home VCR or other electronic devices to commence operation at the programmed time. An alternative embodiment is disclosed which places the controller circuit inside an item of operational equipment, such as a VCR, so that the user responds to voice instructions coming from the operational equipment.



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UNIVERSAL REMOTE CONTROLLER WITH SYNTHESIZED VOICE INTERFACE

FIELD OF INVENTION

This invention is directed to home entertainment remote control devices and in particular, to a user interactive remote controller.

BACKGROUND OF THE INVENTION

Since the advent of the home video cassette recorder or video tape recorder on the entertainment equipment market, there has been recognition of the requirement that the user be able to program his VCR to record programs from various sources, and at different times to be recorded in his absence or while watching other programs. This is the basis of the "time shifting" phenomenon that has formed much of the popular rationale behind the growth of the VCR market. It is perceived that users want to watch their favorite programs when they want to, and not necessarily when these programs are broadcast. Unfortunately, it quickly became apparent that many users were not able to program intricate timer settings for multiple recordings and had little or no interest in reading complex operating instructions of such timer systems, or once read, in remembering how to use them. It is widely perceived that programming a VCR and setting its internal clock is difficult and annoying even for well educated consumers. Such difficulties have even been the subject of comment by a President of the United States to graduating engineers of the California Institute of Technology.

As the home entertainment market has grown, there have been available to the consumer a plethora of different program sources. Not only were normal broadcast channels available through the internal television tuner in the VCR, but additional programming was available over cable and satellite TV sources. This commonly adds to the confounding array of options available to the user, which normally results in confusion, resignation and irritable statements by the consumer that he or she does not understand how to program the family VCR.

Some confusion was reduced or eliminated by the introduction of the universal remote controller which allowed the user to combine the various remote controls on his tabletop into a single unit that controlled all his equipment. The original universal remote controller was introduced by General Electric/RCA in the mid-1980's. This unit was a learning remote which learned the various infrared patterns transmitted by the intrinsic remote controllers supplied by various equipment manufacturers with home entertainment equipment such as televisions, stereo receivers, pre-amplifiers, video cassette recorders and compact disc players. The introduction of the learning remote controller was soon followed by other units that contained libraries of control codes in their internal memories, thereby eliminating the need for the user to teach infrared control codes to the universal remote controller.

Both learning and pre-programmed code universal remote controllers were available in versions that provided additional features including multiple key sequence capability and day-time timers that could be used to control the equipment in the absence of an operator. These became popular as a means of replacing the recording timer, which was normally a part of VCR's, and helped consolidate the various aspects of manipulating multiple program sources and the VCR for unattended program recording. However, all of these units either required teaching infrared codes or programming timers or schedulers for unattended VCR recording and thus suffered from the same difficulties of use as the original VCR timers. Users were still required to read an operations manual which detailed many complicated programming instructions and then had to follow those instructions in order to program and use their equipment. The problem of user instruction generally remained unsolved.

Although many users wanted to enjoy the benefits universal remote controllers provided, they often found these units too difficult to use because of the relatively complex series of actions required to accomplish teaching and programming. It is perceived that pre-programmed universal remote controllers have acquired a greater public acceptance than learning universal

remote controllers because of the formers' reduced complexity. Users did not have to teach infrared codes to the unit and found them to be much less frustrating to use. This simplification has not fully extended to the task of programming timers and schedulers for unattended recording. The VCR Plus product, which uses number sequence codes published in television program schedules, has provided one manner of simplifying entry of recording data and time. However, the user still must read and understand an instruction manual, select the target VCR type and set up the unit, including setting its internal clock.

SUMMARY OF THE INVENTION

The present invention remedies the situation described above by using a voice synthesizer to provide interactive prompting of the user as he/she proceeds to program the timers and other recording facilities of his/her universal remote controller, VCR or even satellite receivers, televisions and cable tuners that may be equipped with timers and controlling devices. Voice synthesis technology is used in the present device to implement verbal prompting in an interactive user interface for programming timers and control systems in VCR's, universal remote controllers, televisions, satellite receivers or cable tuners which are used to control the unattended access and recording of available entertainment programs. The preferred embodiment described herein utilizes a voice synthesis integrated circuit working in conjunction with the device primary microprocessor and acting as a co-processor. Other embodiments may be envisioned, including those where the voice synthesizer chip is implemented in microprocessor code, or with the speech processor on the chip with the controlling microprocessor. Voice synthesis may not be digital in nature, but could take advantage of new analog storage technology available, as well as digital technologies.

The system is distinct from that of the VCR Voice Programmer, a universal remote controller, which has entered the market within the last few months, and is available from Voice Powered Technology, Inc. of Los Angeles, California. The VCR voice program, marked as "patent pending," does not use a voice

synthesizer, but instead recognizes a limited vocabulary spoken by the user and employs the user's voice commands to program the VCR. Utilizing the VCR Voice Programmer, programming instructions are still initiated by the user, rather than the unit instructing the user.

OBJECTS OF THE INVENTION

The objects of the present invention are: To provide a universal remote controller; to provide a universal remote controller that is interactive with the user; to provide a universal remote controller that includes a voice synthesizer to prompt the programming actions by the user; and to provide such a universal remote controller which is useful in controlling VCR's, satellite receivers, televisions, cable tuners and other devices which may be equipped with timers and controlling facilities.

A further object of the present invention is to provide a voice synthesis based user interactive prompting system for programming a remote controller for electronic equipment, whether the controller is intrinsic or integral with the equipment, or is a hand held learning controller or a controller preprogrammed with a library of control codes. Yet another object is to provide a controller for electronic equipment such as a VCR with a voice synthesis based user interactive system for programming the VCR recording timers. Still another object is to provide an item of electronic information equipment, such as a VCR, cable TV tuner or television, with a voice synthesis based user interactive system for programming the control of the intrinsic device and associated auxiliary equipment such as an external VCR, TV and the like.

Other objects and advantages of this invention will become apparent after considering the following disclosure.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a universal remote controller, a VCR and a television set.

Fig. 2 is a block diagram of a universal learning remote controller with voice synthesis prompting.

Fig. 3 is a block diagram of a pre-programmed universal remote controller with voice synthesis prompting.

Fig. 4 is a block diagram of a satellite receiver with a voice prompt remote controller.

Fig. 5 is a block diagram of a cable tuner with a voice prompt remote controller.

Fig. 6 is a block diagram of a two-way interactive cable tuner with voice prompt remote controller.

Fig. 7 is a block diagram of a video cassette recorder with a voice prompt remote controller.

DESCRIPTION OF THE PREFERRED AND ALTERNATE EMBODIMENTS

As required, detailed embodiments of the present invention are disclosed herein. It is, however, to be understood that the disclosed embodiments are merely illustrative of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the system in virtually any appropriately detailed structure.

In overview, the invention is directed to a remote controller for actuating and signalling electronic devices, including means for creating a voice prompt to be heard by a person using the controller, a clock means within the controller, detection means for registering user inputs made in response by a person hearing the voice prompt, circuit means for setting the clock means based upon signals received at the detection means, and transmission means for providing a control signal from the controller to the electronic devices.

An arrangement of a device using such a system is shown in connection with Fig. 1 wherein is depicted a universal remote controller 1 (URC) transmitting command pulses via an infrared light path 2 to a VCR 3 containing conventional player and recorder components and which is conventionally connected to a

television set 4. The circuitry described below need not be implemented within a universal remote controller, but with suitable modifications can be implemented within a VCR, a television, a satellite receiver, a cable tuner or other appropriate devices. Further, it should be appreciated that the remote controller need not provide transmission instructions through an I/R transmission, but may utilize RF transmissions or may be hard wired.

Figs. 2 and 3 respectively disclose the voice prompt circuit in a learning URC wherein each transmission code is learned from source remote controllers, or in a pre-programmed URC where it is necessary to enter a code identifying the target unit to be controlled. In both situations, the interactive voice response system is employed as an aid to the user in operating the unit without need to consult a complex operator's manual. The disclosed system leads the user through each step of a complex activity by prompting at each entry point. In more simple terms, the disclosed remote controller tells the user what to do by speaking directly to him/her in plain, simple instructions.

Fig. 2 illustrates a learning universal remote controller 7, and Fig. 3 illustrates a pre-programmed URC 8. It is certainly possible, although it is not depicted here, to combine the functions of the learning URC 7 and the pre-programmed URC 8 in one unit.

In both URC's 7 and 8, a microprocessor 10 acts as the primary controller of the URC. The controlling program for the microprocessor 10 is stored either in on-chip ROM, EPROM or EEPROM, or in an off-chip memory 12, Fig. 2, which may be either ROM, EPROM or EEPROM. The microprocessor 10 contains an on-chip clock or timer. Power on reset for both the microprocessor 1 and a voice synthesis integrated circuit (IC) 14 is provided by power on reset circuits internal to the microprocessor 10.

An off-chip memory device 15 stores in-coded transmission information, such as in I/R format, for later transmission. In the learning URC configuration 7, Fig. 2, the off-chip memory 15 may take the form of either SRAM or EEPROM. If SRAM is used, either an auxiliary battery or capacitor will be required to

retain memory contents in the event of power outage due to battery removal or other power failure. In the pre-programmed configuration of the URC 8, Fig. 3, the off-chip memory 15 will be a ROM, EPROM or EEPROM containing previously encoded I/R information.

In the learning URC configuration 7, Fig. 2, an I/R input circuit 17 detects I/R patterns from original source I/R controllers and provides these I/R codes to the microprocessor 10 in the form of a pulse train which is then encoded for storage in the off-chip memory 15. The I/R input circuit is not present in the pre-programmed URC configuration 8.

In both configurations, a keyboard 19 provides a detection means and acts as the user command input device for the respective microprocessors 10. It is usually connected to the microprocessor 10 in a matrix organization and is scanned periodically by the microprocessor 10 to detect key presses, but may also consist of keys that are individually connected to the microprocessor 10 and which does not require scanning. The keyboard 19 may also be connected in a combination of matrix and direct connections. The exemplary matrix organization sets the clock within the microprocessor 10 based upon input signals from the keyboard 19. Additionally, the keyboard 19 may contain circuitry to generate a wakeup interrupt to the microprocessor 10 so that the microprocessor can be placed in low power halt or sleep modes when idle, thereby conserving battery power.

In both configurations, Figs. 2 and 3, optional display capability is provided by a display 21, which may be a group of LED's, an LED numeric or alphanumeric display, an LCD display which acts to provide basic first level visual prompting to the user. In the case of LED's or LED display, the LED's are usually scanned by the microprocessor 10, but may be directly connected in the case of only a few LED's. In the case of the LCD display, the display circuit may be implemented by either an off-chip LCD controller interface to the microprocessor 10 or the microprocessor 10 may contain an LCD scanning section to directly produce the control signals for the LCD.

In the embodiments shown in Figs. 2 and 3, I/R output is provided by an I/R emitter circuit 23, which is driven by the regenerated pulse train supplied by the microprocessor 10 in response to user command key inputs at the keyboard 19. The I/R emitter circuit 23, in the illustrated example, consists of one or more I/R emitting diodes driven by an open collector (or open drain) transistor driver which is driven in turn by an output pin from the microprocessor 10. The I/R emitter circuit 23 transmits a control signal to electronic devices, such as the VCR shown in Fig. 1.

Interactive voice prompting is supported by the voice synthesizer IC 14. Voice data stored either in on-chip ROM or in off-chip speech memory 25 is organized in phrases that are keyed according to commands issued by the microprocessor 10 to form the various voice prompts required in response to user key presses on the keyboard 19 in the current state of the system software. If off-chip memory 25 is used, it may be either serial or parallel accessed memory (ROM or EPROM) as necessary for the speech synthesizer IC 14. The output of the speech synthesizer IC 14 is processed by an audio filter and amplifier circuit 27 and output via a speaker 28. The specific requirements of the audio filter and amplifier circuit 27 will vary depending upon the specific output signal generated by the speech synthesizer IC 14 and the acoustic characteristics of the speaker 28 and the enclosure housing the URC 1.

OPERATIONAL DESCRIPTION

The following description is directed to the operation of the preferred embodiment software as executed on the hardware platform described above. Other embodiments of the software may be conceived; however, the basic teaching of the use of the voice synthesis as an interactive user prompting mechanism remains unchanged.

In operation, the first step is power on initialization.

When Power Is First Applied To The Unit. A power initiated reset signal is applied to the microprocessor 10 and the speech synthesizer IC 14. The control software for these two devices

then executes power on initialization routines and then enters the idle command input mode.

The Keyboard Command Input. The control software in the microprocessor 10 is responsible for scanning the keyboard 19 or otherwise accepting user command inputs from the keyboard 19. If an interrupt facility is provided in the keyboard 19 configuration, the keyboard scan routine will wait for a keyboard interrupt to initiate a scan of the keyboard. Otherwise, the keyboard will be scanned on a periodic basis. The time base for this keyboard scan is usually supplied by an internal microprocessor 10 timer interrupt.

Voice Synthesizer Command Input. The control software in the microprocessor 10 is responsible for transmitting commands from the microprocessor to the voice synthesizer IC 14 over the voice command channel. Voice synthesizer ROM has a dictionary of words and phrases that are used to form meaningful messages for the user. In order to construct a phrase, the microprocessor software transmits a series of phrase commands to the voice synthesizer IC 14, each of which is executed in the order received, thereby forming the desired message. Phrase commands are usually stored in the voice synthesizer IC 14 as the phrase is being pronounced with a ready/busy signal being supplied to the microprocessor 10 indicating to the control software that it knows when the speech synthesizer IC 14 is busy speaking and when it is ready to accept another set of phrase commands.

I/R Learning/Compression Algorithm. In the learning URC 7, the control software activates its learning/compression algorithm in response to user keyboard commands. This routine utilizes the timer interrupt facility of the microprocessor 10 to determine all operational parameters of the I/R code to be compressed. Real time analysis of the input signal is performed by the compression part of the algorithm, which reduces the pulse time data detected by the interrupt handlers to a lexicographic representation consisting of character strings representing pulse pattern groups.

Memory Management and Directory Handler. The memory management routines are responsible for organizing the compressed

data in memory in the off-chip memory 12 so that it is quickly and easily accessed in real time for transmission. Generally, the memory manager associates the learned I/R pattern with the key that will be used to activate it. Banks of I/R patterns can be specified for each key so that a key can be used to control several different devices, depending upon which one is selected at the time.

I/R Decompression/Transmission Algorithm. In both URC's 7 and 8, the control software will activate its decompression and transmitting algorithm in response to user keyboard commands. The specific key code activated is used to generate an address pointer to the associated character string representing the I/R code pattern to be transmitted. The character string is then decompressed to obtain pulse timing data which is used by the timer interrupt processing routines to generate the I/R code pulse train that is transmitted by the unit.

Display Control. In both URC's 7 and 8, the display control algorithm is used to activate the associated display. Minimally, this is a small number of LED's indicating learning mode, programming mode, operating mode and the like.

INTERACTIVE RESPONSE EXAMPLE

The following details the use of voice synthesis as a prompt/help system. The description refers to a URC with an LCD display for clock, message and annunciator display, keyboard for command entry, I/R input and output circuits, and a voice synthesis circuit containing a set of available words to be linked together to form the required phrases for user prompting.

The operational description is given in a structured English format similar to the form in "C" programming language.

```
POWER ON (initialization)
{
    Initialize MCU, speech processor, display controller.
    Display "12:00 am", "January 01, 1993."
    Voice:  "Welcome to the XYZ remote control."
    Loop until clock is set,
```

```
        {
            Disable all keys except <CLOCK SET>, <CANCEL>.
            Voice:  "Please set time and date."
            On case of keystroke
            {
                <CLOCK SET>
                    Perform CLOCK SET procedure.
                    Exit from the loop.
                <CANCEL>
                    Exit from the loop.
                default
                    Ignore key.
            }
        }
}

IDLE STATE (base command level)
{
    On case of keystroke
    {
        <CLOCK SET>
            Perform CLOCK SET procedure.
        <LEARN>
            Perform LEARN procedure.
        <PROGRAM EVENT>
            Perform PROGRAM EVENT procedure.
        <EDIT EVENT>
            Perform EDIT EVENT procedure.
        <DELETE EVENT>
            Perform DELETE EVENT procedure.
        <TV>
            Voice:  "Television selected."
            Turn on TV annunciator.
            Select TV control code bank.
        <VCR-1>
            Voice:  "VCR-1 selected."
            Turn on VCR-1 annunciator.
```

```
                Select VCR-1 control code bank.
            <VCR-2>
                Voice:  "VCR-2 selected."
                Turn on VCR-2 annunciator.
                Select VCR-2 control code bank.
            <CABLE>
                Voice:  "Cable Tuner selected."
                Turn on CABLE annunciator.
                Select CABLE control code bank.
            <CD>
                Voice:  "CD Player selected."
                Turn on CD annunciator.
                Select CD control code bank.
            <RCVR>
                Voice:  "AM/FM Receiver selected."
                Turn on RCVR annunciator.
                Select RCVR control code bank.
            <AUX-1>
                Voice:  "Auxiliary 1 selected."
                Turn on AUX-1 annunciator.
                Select AUX-1 control code bank.
            <AUX-2>
                Voice:  "Auxiliary 2 selected."
                Turn on AUX-2 annunciator.
                Select AUX-2 control code bank.
            <1>, <2>,..., <9>, <0>, <UP-ARROW>, <DOWN-ARROW>, <>>,
            <<>,  <>>>,  <<<>,  <PLAY>,  <RCD>,  <PAUSE>,  <STOP>,
            <PROG>, <WINDOW>, <A/B>, <MUTE>, <TUNE>
                Access code for selected key from current code
                    bank.
                Display key command name (cmnd).
                Output code selected.
        }
    }
    PROGRAM EVENT (set event start, length, and commands)
    {
```

```
Display PROGRAM EVENT annunciator.
Select next available event number nn.
Display event number (Event #: nn)
Voice:  "Programming event number <nn>."
Display current date (MM/DD/YY format).
Voice:  "Enter event date."
Perform SET DATE procedure, store date entered
     as Event Date.
Display current time (HH:MM format).
Voice:  "Enter event start time."
Perform SET TIME procedure, store time entered
     as Event Date.
Turn on START EVENT annunciator.
Voice:  "Enter event start commands."
Initialize command number cc to 01.
Loop until <ENTER> key is pressed,
{
     Display command entry (CMD cc:cmnd) where cc is command
          number and cmnd is command name (initially blank).
     Voice:  "Enter command <cc>."
     On case of keystroke
     {
          <ENTER>
               Voice:  "Command entry complete."
               Exit from loop.
          <TV>
               Voice:  "Television selected."
               Turn on TV annunciator.
               Store TV code bank command as command cc.
          <VCR-1>
               Voice:  "VCR-1 selected."
               Turn on VCR-1 annunciator.
               Store VCR-1 code bank command as command cc.
          <VCR-2>
               Voice:  "VCR-2 selected."
               Turn on VCR-2 annunciator.
               Store VCR-2 code bank command as command cc.
```

```
                <CABLE>
                    Voice:  "Cable Tuner selected."
                    Turn on CABLE annunciator.
                    Store CABLE code bank command as command cc.
                <CD>
                    Voice:  "CD Player selected."
                    Turn on CD annunciator.
                    Store CD code bank command as command cc.
                <RCVR>
                    Voice:  "AM/FM Receiver selected."
                    Turn on RCVR annunciator.
                    Store RCVR code bank command as command cc.
                <AUX-1>
                    Voice:  "Auxiliary 1 selected."
                    Turn on AUX-1 annunciator.
                    Store AUX-1 code bank command as command cc.
                <AUX-2>
                    Voice:  "Auxiliary 2 selected."
                    Turn on AUX-2 annunciator.
                    Store AUX-2 code bank command as command cc.
                <1>, <2>,..., <9>, <0>, <UP-ARROW>, <DOWN-ARROW>,
                <>>, <<>, <>>>, <<<>, <PLAY>, <RCD>, <PAUSE>,
                <STOP>, <PROG>, <WINDOW>, <A/B>, <MUTE>, <TUNE>
                    Save key code as command cc.
                    Display (CMD cc:cccc) with selected key name
                        cccc.
                    Voice:  "Command <cc>, <cmnd name>."
                <?>
                    Voice:  "Enter event start command <cc>."
                <CANCEL>
                    Exit from COMMAND ENTRY procedure.
            }
        Increment command number cc.
    }
    Display (00:00)
    Voice:  "Enter event length."
```

```
Perform SET TIME procedure, store time entered as
     Event Length.
Turn on TERMINATE EVENT annunciator.
Voice:  "Enter event termination commands."
Initialize command number cc to 01.
Loop until <ENTER> key is pressed,
{
     Display command entry (CMD cc:cmnd) where cc is command
          number and cmnd is command name (initially blank).
     Voice:  "Enter command <cc>."
     On case of keystroke
     {
          <ENTER>
               Voice:  "Command entry complete."
               Exit from loop.
          <TV>
               Voice:  "Television selected."
               Turn on TV annunciator.
               Store TV code bank command as command cc.
          <VCR-1>
               Voice:  "VCR-1 selected."
               Turn on VCR-1 annunciator.
               Store VCR-1 code bank command as command cc.
          <VCR-2>
               Voice:  "VCR-2 selected."
               Turn on VCR-2 annunciator.
               Store VCR-2 code bank command as command cc.
          <CABLE>
               Voice:  "Cable Tuner selected."
               Turn on CABLE annunciator.
               Store CABLE code bank command as command cc.
          <CD>
               Voice:  "CD Player selected."
               Turn on CD annunciator.
               Store CD code bank command as command cc.
          <RCVR>
               Voice:  "AM/FM Receiver selected."
```

```
                    Turn on RCVR annunciator.
                    Store RCVR code bank command as command cc.
               <AUX-1>
                    Voice:  "Auxiliary 1 selected."
                    Turn on AUX-1 annunciator.
                    Store AUX-1 code bank command as command cc.
               <AUX-2>
                    Voice:  "Auxiliary 2 selected."
                    Turn on AUX-2 annunciator.
                    Store AUX-2 code bank command as command cc.
               <1>, <2>,..., <9>, <0>, <UP-ARROW>, <DOWN-ARROW>,
               <>>, <<>, <>>>, <<<>, <PLAY>, <RCD>, <PAUSE>,
               <STOP>, <PROG>, <WINDOW>, <A/B>, <MUTE>, <TUNE>
                    Save key code as command cc.
                    Display (CMD cc:cccc) with selected key name
                         cccc.
                    Voice:  "Command <cc>, <cmnd name>."
               <?>
                    Voice:  "Enter event termination command
                         <cc>."
               <CANCEL>
                    Exit from COMMAND ENTRY procedure.
          }
          Increment command number cc.
     }
     Voice:  "Event <nn> complete."
}
EDIT EVENT (review events, and edit if needed)
{
     Turn on EDIT EVENT annunciator.
     Save original event date.
     Voice:  "Review or edit an event."
     Display event number (Event #: nn), with nn blank.
     Voice:  "Enter event number to edit."
     On case of keystroke
     {
```

```
        <1>, <2>,..., <9>, <0>
             Select event number nn.
        <UP-ARROW>
             Increment event number
        <DOWN-ARROW>
             Decrement event number
        <CANCEL>
             Exit from EDIT EVENT procedure.
    }
    Display selected event number (Event #: nn).
    Voice:  "Event <nn> date is <day of week, month, day,
         year>."
    Display event date (MM/DD/YY format)>
    Voice:  "Edit date?"
    On case of keystroke
    {
         <YES>
              Perform SET DATE procedure.
              Voice:  "Event <nn> date is <weekday, month, day,
                   year>."
         <NO>
              Continue.
         <CANCEL>
              Exit from EDIT EVENT procedure.
    }
    Turn on START EVENT annunciator.
    Voice:  "Event starts at <hours, minutes, <am/pm>>."
    Display event start time (HH:MM format).
    Voice:  "Edit start time?"
    On case of keystroke
    {
         <YES>
              Perform SET TIME procedure.
              Voice:  "Event starts at <hours, minutes,
                   <am/pm>>."
         <NO>
              Continue
```

```
        <CANCEL>
            Exit from EDIT EVENT procedure.
    }
    Display first event start command (CMD cc:cmnd)
    Voice: "Event start commands, press up-arrow and down-arrow
        to review, press command key to change, press <DELETE>
        key to delete."
    Loop for each of available commands
    {
        Display command (CMD cc:cmnd) where cc is current
            command number and cmnd is the current command
            name.
        Voice:  "Command <cc>, <cmnd name>."
        On case of keystroke
        {
            <ENTER>
                Voice:  "Editing finished."
                Exit from the loop.
            <UP-ARROW>
                Advance to next command, cc = cc+1.
                Voice:  "Command <cc>, <cmnd name>."
            <DOWN-ARROW>
                Back up to previous command, cc = cc-1.
                Voice:  "Command <cc>, <cmnd name>."
            <DELETE>
                Voice:  "Delete command <cc>?"
                On case of keystroke,
                {
                    <YES>
                        Delete command from memory.
                        Voice>  "Command deleted."
                    <NO>
                        Continue.
                }
            <?>
                Voice:  "Event starts commands, press up
                    -arrow/down-arrow to review, press
```

```
                    command key to change, press <DELETE>
                    key to delete."
               <1>, <2>, . . . , <9>, <0>, <UP-ARROW>, <DOWN-ARROW>,
               <>>, <<>, <>>>, <<<>, <PLAY>, <RCD>, <PAUSE>,
               <STOP>, <PROG>, <WINDOW>, <A/B>, <MUTE>, <TUNE>
                    Save key code as command cc.
                    Display (CMD cc:cccc) with selected key name
                         cccc.
                    Voice:  "Command <cmnd name> stored."
               <CANCEL>
                    Restore original event data.
                    Exit from EDIT EVENT procedure.
          }
          Increment command number cc.
     }
     Turn on TERMINATE EVENT annunciator.
     Voice:  "Event length is <hours, minutes>."
     Display event length (HH:MM format).
     Voice:  "Edit event length?"
     On case of keystroke
     {
          <YES>
               Perform SET TIME procedure.
               Voice:  "Event length is <hours, minutes>."
          <NO>
               Continue
          <CANCEL>
               Exit from EDIT EVENT procedure.
     }
     Display first event termination (CMD cc:cmnd)
     Voice:  "Event termination commands, press up-arrow and
          down-arrow to review, press command key to change,
          press <DELETE> key to delete."
     Loop for each of available commands
     {
```

```
Display command (CMD cc:cmnd) where cc is current
     command number and cmnd is the current command
     name.
Voice:  "Command <cc>, <cmnd name>."
On case of keystroke
{
     <ENTER>
          Voice:  "Editing finished."
          Exit from the loop.
     <UP-ARROW>
          Advance to next command, cc = cc+1.
          Voice:  "Command <cc>, <cmnd name>."
     <DOWN-ARROW>
          Back up to previous command, cc = cc-1.
          Voice:  "Command <cc>, <cmnd name>."
     <DELETE>
          Voice:  "Delete command <cc>?"
          On case of keystroke,
          {
               <YES>
                    Delete command from memory.
                    Voice>  "Command deleted."
               <NO>
                    Continue.
     }
     <?>
          Voice:  "Event termination commands, press
               up-arrow/down-arrow to review, press
               command key to change, press <DELETE>
               key to delete."
     <1>, <2>,..., <9>, <0>, <UP-ARROW>, <DOWN-ARROW>,
     <>>, <<>, <>>>, <<<>, <PLAY>, <RCD>, <PAUSE>,
     <STOP>, <PROG>, <WINDOW>, <A/B>, <MUTE>, <TUNE>
          Save key code as command cc.
          Display (CMD cc:cccc) with selected key name
               cccc.
          Voice:  "Command <cmnd name> stored."
```

```
                    <CANCEL>
                        Restore original event data.
                        Exit from EDIT EVENT procedure.
                }
                Increment command number cc.
            }
        }
        DELETE EVENT (delete existing event(s))
        {
            Turn on DELETE EVENT annunciator.
            Display event number (Event #: nn), with nn blank.
            Voice:  "Enter event number to delete."
            On case of keystroke,
            {
                <1>, <2>,..., <9>, <0>
                    Set event number nn to the entered value.
                    Voice:  "Delete event <nn>?"
                    On case of keystroke,
                    {
                        <YES>
                            Delete event from memory.
                            Voice:  "Event deleted."
                            Exit from DELETE EVENT procedure.
                        <NO>
                            Continue.
                        <CANCEL>
                            Exit from DELETE EVENT procedure.
                    }
                <CANCEL>
                    Exit from DELETE EVENT procedure.
                default
                    Continue.
            }
        }
        CLOCK SET (set hour, minute, date)
        {
```

```
        Save current time, date from clock.
        Display current time (HH:MM format).
        Flash CLOCK annunciator.
        Voice:  "Enter current time."
        Perform SET TIME procedure.
        Display current date (MM/DD/YY format).
        Voice:  "Set current date."
        Perform SET DATE procedure.
        Voice:  "Current time and date are now set."
    }
    SET TIME (set the HH:MM time fields)
    {
        Flash HH field.
        Voice:  "Set hours."
        Loop until hours (HH field) is set
        {
            Disable all keys except <1>, <2>,..., <9>, <0>,
            <UP-ARROW>, <DOWN-ARROW>, <ENTER>, <am>, <pm>, <?>,
            <CANCEL>.
            On case of keystroke
            {
                <UP-ARROW>
                    Increment HH field, with roll over from
                        12 -> 1.
                <DOWN-ARROW>
                    Decrement HH field, with roll over from
                        1 -> 12.
                <1>, <2>,..., <9>, <0>
                    Enter number into HH field.
                <am>, <pm>
                    Set AM or PM mode for clock.
                <ENTER>
                    Store HH field value in clock.
                    Flash MM field.
                    Voice:  "Set minutes."
                    Exit from the loop.
```

```
                <?>
                    Voice:  "Press up-arrow, down-arrow, or
                        number keys to set hours.  Press enter
                        key to store."
                <CANCEL>
                    Restore original time, date.
                    Exit from SET TIME procedure.
                default
                    Voice:  "Entry Error."
            }
        }
        Loop until minutes (MM field) is set,
        {
            Disable all keys except <1>, <2>,..., <9>, <0>,
            <UP-ARROW>, <DOWN-ARROW>, <ENTER>, <am>, <pm>, <?>,
            <CANCEL>.
            On case of keystroke
            {
                <UP-ARROW>
                    Increment MM field, with roll over from
                        60 -> 1.
                <DOWN-ARROW>
                    Decrement MM field, with roll over from
                        1 -> 60.
                <1>, <2>,..., <9>, <0>
                    Enter number into MM field.
                <am>, <pm>
                    Set AM or PM mode for clock.
                <ENTER>
                    Store MM field value in clock.
                    Voice:  announce time HH:MM, <am/pm>.
                    Exit from the loop.
                <?>
                    Voice:  "Press up-arrow, down-arrow, or
                        number keys to set minutes.  Press enter
                        key to store."
```

```
                    <CANCEL>
                         Restore original time, date.
                         Exit from SET TIME procedure.
                    default
                         Voice:  "Entry Error."
               }
          }
     }
     SET DATE (set MM/DD/YY date fields)
     {
          Flash MM field.
          Voice:  "Set month."
          Loop until month (MM field) is set,
          {
               Disable all keys except <1>, <2>,..., <9>, <0>,
               <UP-ARROW>, <DOWN-ARROW>, <ENTER>, <?>, <CANCEL>.
               On case of keystroke
               {
                    <UP-ARROW>
                         Increment MM field, with roll over from
                              12 -> 1.
                    <DOWN-ARROW>
                         Decrement MM field, with roll over from
                              1 -> 12.
                    <1>, <2>,..., <9>, <0>
                         Enter number into MM field.
                    <ENTER>
                         Store MM field value in clock.
                         Flash DD field.
                         Voice:  "Set date."
                         Exit from the loop.
                    <?>
                         Voice:  "Press up-arrow, down-arrow, or
                              number keys to set month.  Press enter
                              key tostore."
                    <CANCEL>
                         Restore original time, date.
```

```
                    Exit from SET TIME procedure.
                default
                    Voice:  "Entry Error."
            }
        }
        Loop until date (DD field) is set,
        {
            Disable all keys except <1>, <2>,..., <9>, <0>,
            <UP-ARROW>, <DOWN-ARROW>, <ENTER>, <?>, <CANCEL>.
            On case of keystroke
            {
                <UP-ARROW>
                    Increment DD field, with roll over from
                        [28,29,30,31]->1.
                <DOWN-ARROW>
                    Decrement DD field, with roll over from
                        [28,29,30,31]->12.
                <1>, <2>,..., <9>, <0>
                    Enter number into DD field.
                <ENTER>
                    Store DD field value in clock.
                    Flash YY field.
                    Voice:  "Set year."
                    Exit from the loop.
                <?>
                    Voice:  "Press up-arrow, down-arrow, or
                        number keys to set date.  Press enter
                        key to store."
                <CANCEL>
                    Restore original time, date.
                    Exit from SET DATE procedure.
                default
                    Voice:  "Entry Error."
            }
        }
        Loop until year (YY field) is set,
        {
```

```
Disable all keys except <1>, <2>,..., <9>, <0>,
<UP-ARROW>, <DOWN-ARROW>, <ENTER>, <?>, <CANCEL>.
On case of keystroke
{
     <UP-ARROW>
          Increment YY field, with roll over from
               99 -> 00.
     <DOWN-ARROW>
          Decrement YY field, with roll over from
               00 -> 99.
     <1>, <2>,..., <9>, <0>
          Enter number into YY field.
     <ENTER>
          Store YY field value in clock.
          Voice: announce date (weekday, month, 1993).
          Display new date:  MM/DD/YY.
          Exit from the loop.
     <?>
          Voice:  "Press up-arrow, down-arrow, or
               number keys to set year.  Press enter
               key to store."
     <CANCEL>
          Restore original time, date.
          Exit from SET DATE procedure.
     default
          Voice:  "Entry Error."
   }
 }
}
```

In review, the remote controller may be a separate unit or may be part of an electronic player device, such as a video cassette recorder or video tape recorder, and comprises means for creating a voice prompt to be heard by a person utilizing the controller. The controller has an internal clock and a detection means, such as a keyboard, for registering user inputs made in response by a person hearing the voice prompt. It includes a circuit for setting the clock based upon the signals received at

the detection means and transmitter means for providing a control signal from the controller to the electronic devices.

Specifically, the invention may take the form of an electronic player device, such as the VCR 2 which has internal conventional player and recorder components. The circuit systems disclosed in connection with Figs. 2 and 3 may be employed within the player device so that the device would "speak" directly to the user. The I/R transmitter circuit components could be used to signal operational electronic equipment which are susceptible of being signalled and are reactive to the transmitted code.

Particular types of electronic equipment for which the above described system is believed to be useful include VCR's, cable TV tuners, satellite receivers and televisions.

An exemplary satellite receiver/tuner with an internal voice prompt remote controller is shown in connection with Fig. 4. Therein, numerals corresponding to the numerals used in connection with Figs. 2 and 3 indicate the same or similar circuit components. In addition, the satellite receiver/tuner includes a satellite dish control 30 receiving signals from a dish motor 31 and an LNB control 32 and being controlled by inputs from the MCU 10. Accordingly, inputs made by the user, such as on the keypad 19, in response to voice queries and directives uttered by the speech ROM 25 and voice synthesizer 14 control the satellite dish controller 30.

The satellite dish receiver/tuner includes a tuner 35 receiving signals from an LNB control 36 and directing its outputs to an audio multiplexer 38 and a video multiplexer 40. Inputs to the audio multiplexer 38 are provided through baseband audio inputs 42 and outputs to baseband audio out pins 44. Inputs to the video multiplexer 40 are provided through baseband video inputs 46 and outputs to a baseband video pin 48.

A channel 3 and 4 modulator 50 with its output pin 51 ties to the audio and video output lines.

Using the satellite receiver/tuner with internal voice prompt, the disclosed equipment queries and instructs the user concerning the clock setting and channelization procedures to be accomplished. The user provides his programming inputs via the

keypad 19, which are processed by the MCU 10 to control the satellite dish.

A standard cable box or tuner with an internal voice prompt remote controller is shown in connection with Fig. 5. This device is substantially the same as the satellite receiver/tuner of Fig. 4 except it substitutes a cable interface unit 55 for the satellite dish control 30 of Fig. 4. Input leads to the cable interface unit 55 come from a cable connector 57 and an antenna 58. This device acts as a programmable cable controller for feeding in signals from a CATV system.

Generally the same type of arrangement is shown in connection with Fig. 6 with the exception that the cable connector 59 is a two-way type, meaning that both inputs and outputs can be made into the CATV system. The interactive system, for example, allows delivery of data and programming services while a supplier engages in two-way communication with a customer.

An exemplary VCR with an interval voice synthesis prompt remote control is shown in connection with Fig. 6. This system uses the voice synthesis circuit as shown in Fig. 4 and adds VCR components in place of the satellite receiver/tuner components. The circuit includes a power supply 60 supplying board power. It drives a tape mechanism 62 containing heads 63. Door control and motor control leads 64 and 65 extend from the MCU 10. Record elect and play elect switches 67 and 68 connect to the tape mechanism 62. As is normal, the VCR includes a television tuner 70 with an input lead 71, such as from an antenna.

While the VCR shown in Fig. 6 is a video tape player, optical disc components may be substituted, or as new methods of data storage and retrieval are developed, these could be implemented with the voice synthesis prompt remote control components without departing from the scope of the invention.

It is to be understood that while certain forms of this invention have been illustrated and described, the invention is not limited thereto, except insofar as its limitations are included in the following claims.

CLAIMS

What is claimed and desired to be secured by Letters Patent is as follows:

1. A remote controller for actuating and signalling electronic devices, said controller comprising means for creating voice prompts to be heard by a person using the controller, clock means within said controller, detection means for registering user inputs made in response by a person hearing said voice prompts, circuit means for setting said clock means based upon signals received at said detection means, and transmission means for providing a control signal from said controller to said electronic devices.

2. A universal learning remote controller comprising:

a) transmission means for signalling electronic equipment reactive to a particular transmitted code;

b) memory means in said controller for learning said particular transmitted code so that said controller may actuate said electronic equipment;

c) a timer associated with said memory means;

d) voice prompt means operably connected to said memory means for facilitating setup of said remote controller to learn said particular transmitted code, said voice prompt means prompting a user to identify predetermined times, dates and channels;

e) detection means for registering user inputs made in response to said voice prompt means; and

f) circuit means for setting within said memory means signals received at said detection means and causing said transmission means to send said code to said electronic equipment.

3. A universal pre-programmed remote controller comprising:

a) transmission means for signalling electronic equipment reactive to a particular transmitted code;

b) memory means in said controller including a library of codes, one of which is said particular transmitted code;

c) a timer associated with said memory means;

d) voice prompt means operably connected to said memory means for facilitating setup of said remote controller by selecting a code from said library, said voice prompt means prompting a user to identify predetermined times, dates and channels;

e) detection means for registering user inputs made in response to said voice prompt means; and

f) circuit means for setting within said memory means signals received at said detection means and causing said transmission means to send said code to said electronic equipment.

4. A remote controller for activating and signalling recording devices, said controller comprising means for creating voice prompts to be heard by a person using the controller, means for setting an internal clock, means for setting duration of recording, means for designating a channel for recording, detection means for registering user inputs made in response by a person hearing said voice prompts, memory means for at least temporarily storing a clock setting, duration of recording and channel designation, and transmission means for providing a control signal from said controller to said recording devices.

5. An electronic player device in the form of a video tape recorder and comprising:

a) player components for playback of video tapes;

b) recorder components for recording of video tapes;

c) means for creating a voice prompt to be heard by a person using said video tape recorder;

d) clock means within said video tape recorder;

e) detection means for registering user inputs made in response by a person hearing said voice prompt; and

f) circuit means for setting said clock means based upon signals received at said detection means.

6. An electronic player device in the form of a video tape recorder and comprising:

a) player components for playback of video tapes;

b) recorder components for recording of video tapes;

c) an internal timer and control means including a memory for initiating recording at predetermined times, dates and channels;

d) an internal voice synthesizer means for prompting a user to identify predetermined times, dates and channels for recording;

e) detection means for registering user inputs made in response to said voice synthesizer means; and

f) circuit means for setting within said memory signals relating to said timer, based upon signals received at said detection means, and causing said control means to initiate recording at said predetermined times, dates and channels.

7. The electronic player device set forth in Claim 6 including:

a) a remote controller within said video tape recorder for signalling auxiliary electronic equipment other than said video tape recorder which are susceptible of being signalled and which are receptive to a particular transmitted code; and

b) said voice synthesizer means providing instruction to a user to set said clock for timed actuation of said auxiliary electronic equipment.

8. The electronic player device set forth in Claim 7 wherein said remote controller contains code intrinsic to an item of said auxiliary electronic equipment.

9. The electronic player device set forth in Claim 7 wherein said remote controller is a preprogrammed universal remote controller.

10. The electronic player device set forth in Claim 7 wherein said remote controller is a learning universal remote controller.

11. An electronic device comprising:

a) a tuner for receiving electronic communication signals;

b) an internal timer and control means including a memory for initiating functions at predetermined times, dates and channels;

c) an internal voice synthesizer means for prompting a user to identify predetermined times, dates and channels;

d) detection means for registering user inputs made in response to said voice synthesizer means; and

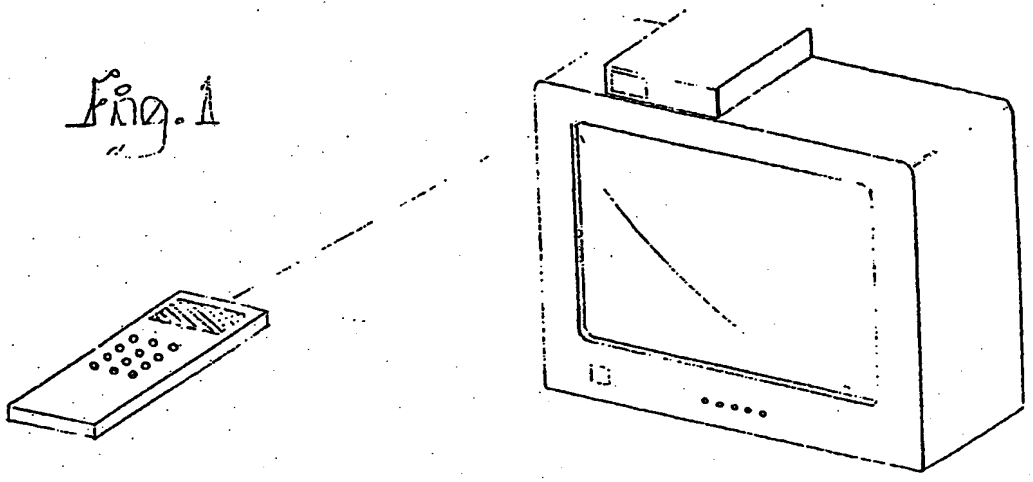
e) circuit means for setting within said memory signals relating to said timer, based upon signals received at said detection means, and causing said control means to initiate transmission of control means signals at said predetermined times, dates and channels.

12. The electronic device set forth in Claim 11 wherein said tuner is a cable television tuner.

13. The electronic device set forth in Claim 11 wherein said tuner is a satellite receiver.

14. The electronic device set forth in Claim 11 wherein said tuner is a television tuner.

Fig. 1



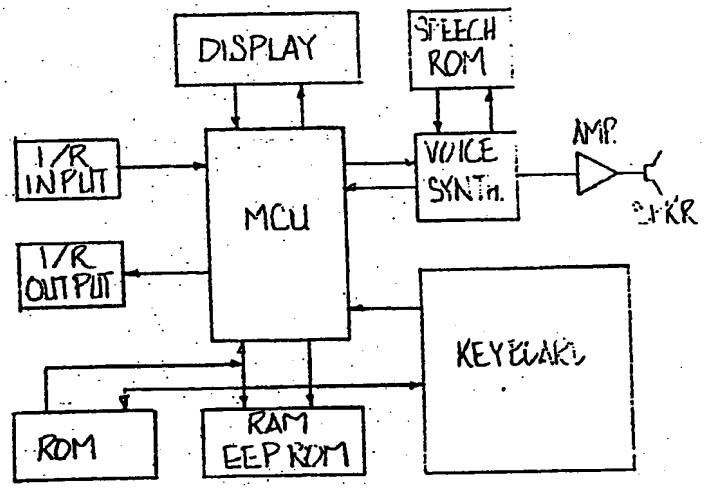


Fig. 2b

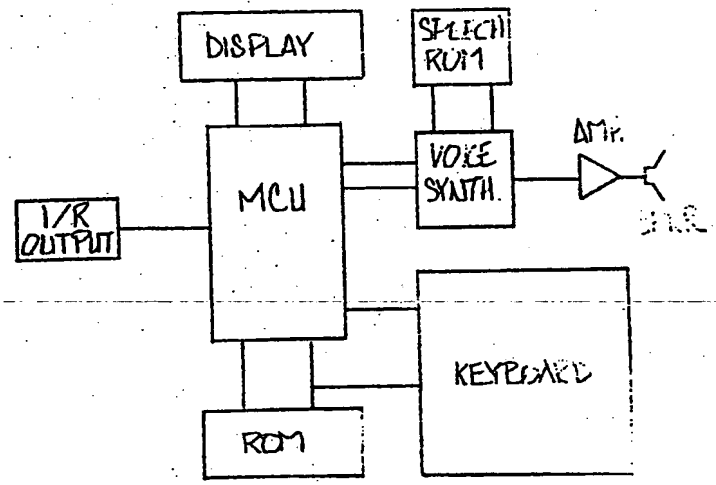


Fig. 2

Fig. 4

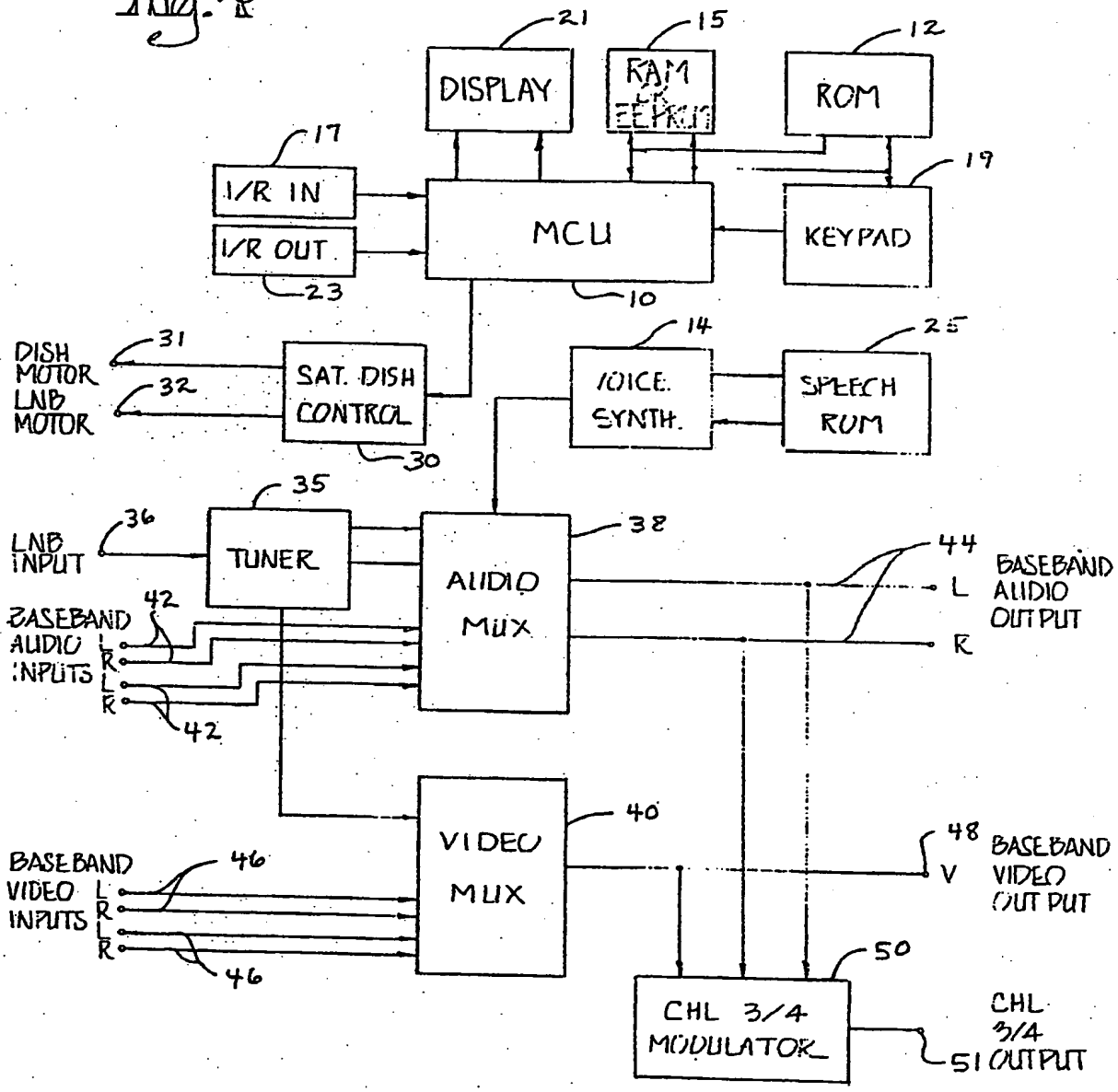

DISPLAY
21
RAM EEPROM
15
ROM
12
I/R IN
17
I/R OUT
23
MCU
10
KEYPAD
19
DISH MOTOR
31
LNB MOTOR
32
SAT. DISH CONTROL
30
VOICE SYNTH.
14
SPEECH ROM
25
LNB INPUT
36
TUNER
35
AUDIO MUX
38
BASEBAND AUDIO INPUTS
42
BASEBAND AUDIO OUTPUT
44
L
R
VIDEO MUX
40
BASEBAND VIDEO INPUTS
46
BASEBAND VIDEO OUT PUT
48
V
CHL 3/4 MODULATOR
50
CHL 3/4 OUTPUT
51

Fig. 5

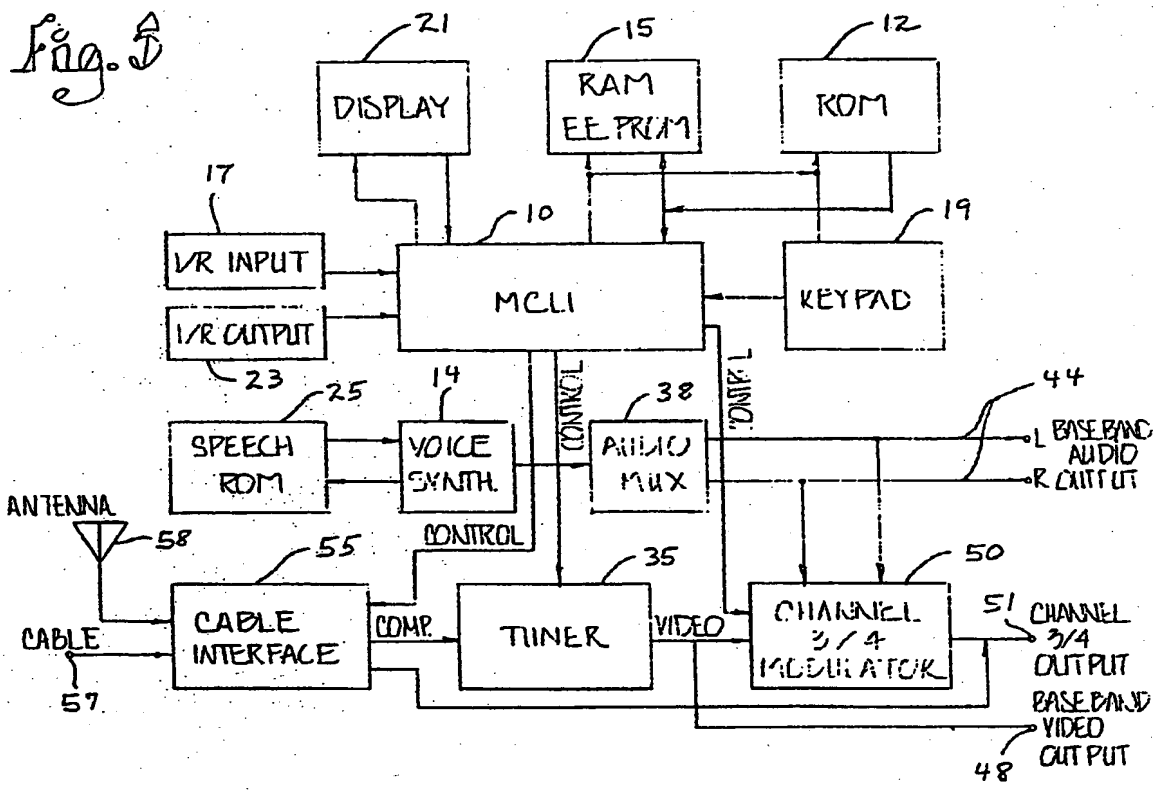

21
DISPLAY
15
RAM
EEPROM
12
ROM
17
V/R INPUT
I/R OUTPUT
23
10
MCU
19
KEYPAD
25
SPEECH
ROM
14
VOICE
SYNTH.
CONTROL
38
AUDIO
MUX
CONTROL
44
L BASEBAND
AUDIO
R OUTPUT
ANTENNA
58
CONTROL
55
CABLE
INTERFACE
CABLE
57
COMP.
35
TUNER
VIDEO
50
CHANNEL
3/4
MODULATOR
51
CHANNEL
3/4
OUTPUT
BASEBAND
VIDEO
OUTPUT
48

Fig. 6

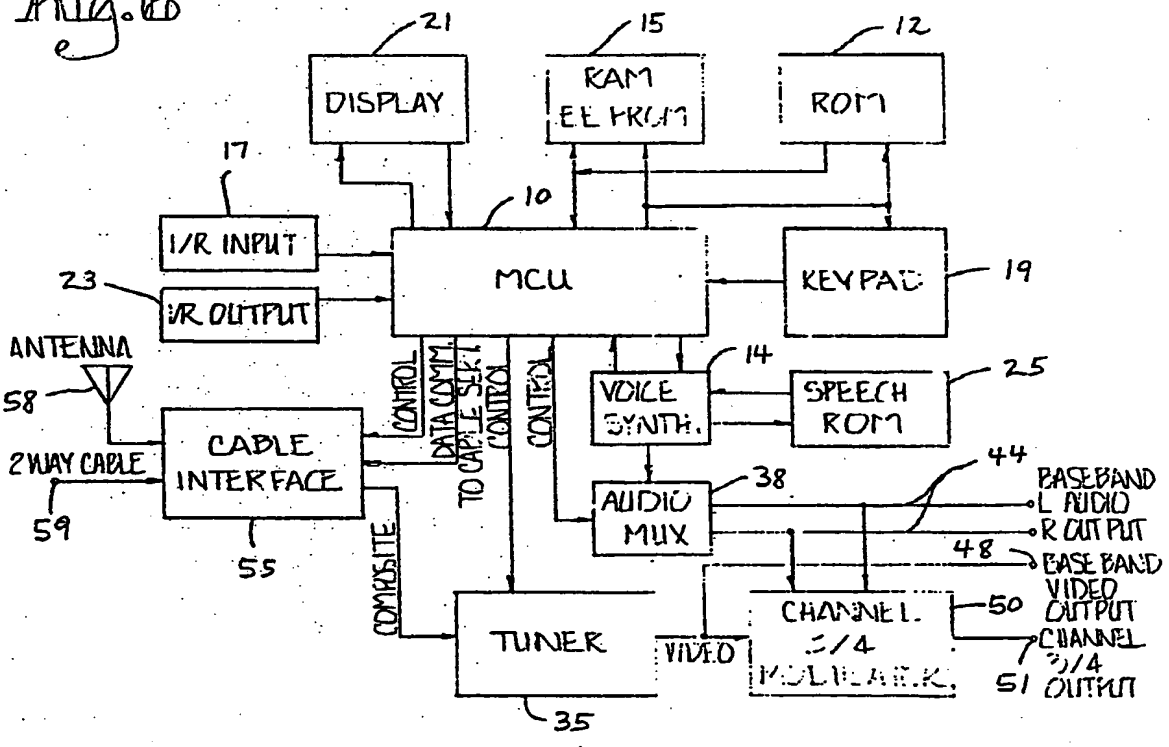
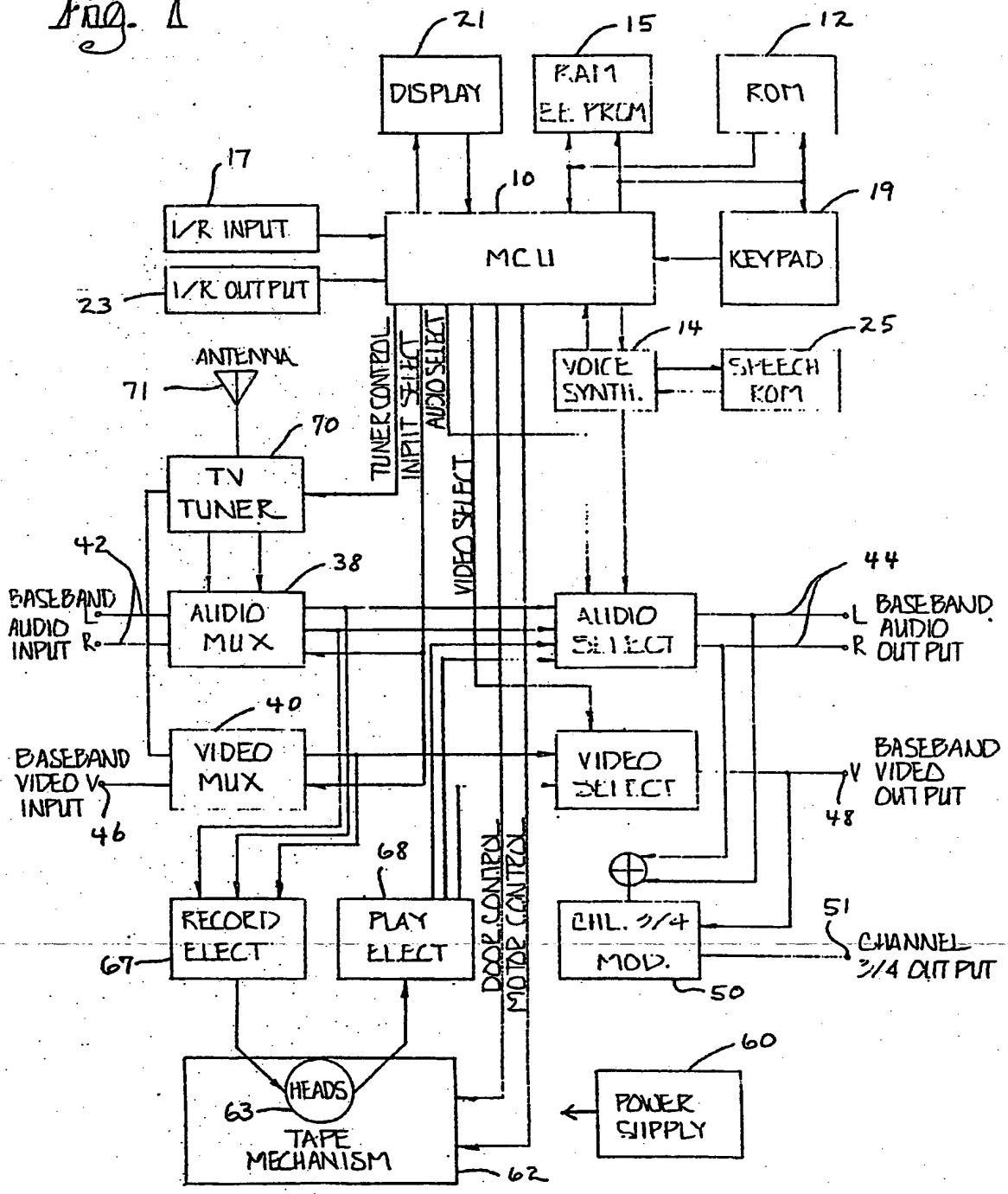

21
DISPLAY
15
RAM
EE PROM
12
ROM
17
I/R INPUT
10
MCU
KEYPAD
19
23
I/R OUTPUT
ANTENNA
58
14
VOICE SYNTH.
SPEECH ROM
25
CONTROL
DATA COMM.
TO CABLE SET
CONTROL
CONTROL
2 WAY CABLE
59
CABLE INTERFACE
55
AUDIO MUX
38
44
BASEBAND L AUDIO
R OUTPUT
48
BASEBAND VIDEO OUTPUT
COMPOSITE
TUNER
VIDEO
CHANNEL 3/4 MODULATOR
50
CHANNEL 3/4 OUTPUT
51
35

Fig. 7


21
DISPLAY
15
RAM
EE. PROM
12
ROM
17
I/R INPUT
10
MCU
19
KEYPAD
23
I/R OUTPUT
14
VOICE SYNTH.
25
SPEECH ROM
ANTENNA
71
70
TV TUNER
TUNER CONTROL
INPUT SELECT
AUDIO SELECT
VIDEO SELECT
42
38
BASEBAND AUDIO INPUT
L
R
AUDIO MUX
AUDIO SELECT
44
L BASEBAND AUDIO OUT PUT
R OUT PUT
40
VIDEO MUX
VIDEO SELECT
BASEBAND VIDEO INPUT
46
BASEBAND VIDEO OUT PUT
48
68
RECORD ELECT
PLAY ELECT
DOOR CONTROL
MOTOR CONTROL
CHL. 3/4 MOD.
51
CHANNEL 3/4 OUT PUT
50
67
HEADS
63
TAPE MECHANISM
62
60
POWER SUPPLY

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/05931

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :H04N 5/76
US CL : 358/335
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 358/335; 360/33.1; 348/734; 379/102, 104, 105; 455/4.1, 4.2.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

358/310; 360/35.1; 455/179.1; H04N 5/76, 5/78, 5/781, 5/782, 5/783, 5/92, 9/79, 5/44.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS: "voice synthesiz?" and "remote controll?"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 4,885,766 (YASUOKA et al.) 05 December 1989, column 5, lines 3-30; column 9, lines 34-46; column 7; and Fig. 4.	1, 3-9, 11, and 14 ---------- 2,10, and 12-13
Y	US, A, 4,706,121 (YOUNG) 10 November 1987, column 4, lines 30-52.	12-13
Y	US, A, 4,959,810 (DARBEE et al.) 25 September 1990, column 9, line 47 to column 10, line 6.	2-3 and 7-10

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
22 AUGUST 1994

Date of mailing of the international search report
SEP 22 1994

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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/05931

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,899,370 (KAMEO et al.) 06 February 1990, Fig. 1 and columns 5-8.	1, 4-6, 11, and 14
---		---
Y		2-3, 7-9, and 12-13

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